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USER'S GUIDE TO THE SOLAR KWIC FILE

Timothy C. Diller, et al

System Development Corporation

Prepared for:

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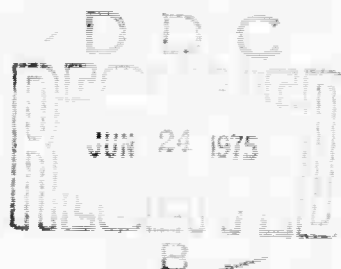ADA011178

USER'S GUIDE TO

THE SOLAR KWIC FILE

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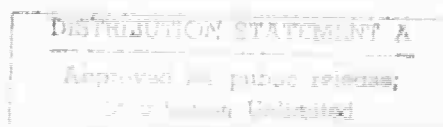
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This document contains a general explanation of the KWIC file of SOLAR (a semantically-Oriented Lexical Archive). It is intended as an introduction and reference manual for the on-line user, the casual reader, or the data collector.

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1.

ABSTRACT

This document contains a general explanation of the KWIC file of
SOLAR (a Semantically-Oriented Lexical Archive). It is intended as an
introduction and reference manual for the on-line user, the casual
reader, or the data collector. The document indicates the design
concepts, the resulting file structure, the intended file content,
retrieval procedures, and data collection procedures. A complete list
of SOLAR documentation is given in the introduction to this document.

FOREWORD

This document is one of a series provided by System Development
Corporation as a guide to the SOLAR system. Users are encouraged to
advise us by phone or in writing of errors, ambiguities, or other
deficiencies and difficulties arising in the use of this document and/or
the SOLAR system.   Communicate with:

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Table of Contents

1.   INTRODUCTION

SOLAR OVERVIEW

This section serves as a common preface to each of the user's
guides describing the SOLAR files. It outlines the goals of SOLAR and
the relationship of each file to those goals. It ends with a list of
the documents describing SOLAR.

SOLAR is intended to provide easy access to a large variety of
semantic data pertaining to a selected set of English words. Data have
been collected to date on about 1,000 SUR words, i.e., words found in
the lexicons of the Speech Understanding Research groups being sponsored
by ARPA.(1) Each of the eight principal SOLAR files contains semantic
data of a different type. Two supplementary files facilitate use of the
archive: a word index and a bibliography.(2)

(1) The file of __semantic analyses__ consists of formal descriptions
of word meanings, primarily those descriptions given in papers written
by linguists, philosophers, and computer scientists. Whatever
information the author presents on such topics as predicate-argument
relations, semantic components, presuppositions, and/or entailment is
abstracted. In addition, qualifications and informal explanations by
the author are included as are criticisms of his description by other
writers and/or by us.

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(1)Although the words for which data is currently being collected
all come from the lexicons being used by the SUR projects at
Carnegie-Mellon University, Bolt Beranek and Newman, and System
Development Corporation, we are willing to extract and collect data on
other word sets also.
(2)We wish to acknowledge John Olney's contributions to the
archive: he was largely responsible for the original design of SOLAR as
set forth in Miller and Olney (1973) and continues to be responsible for
the preparation of integrative summaries of conceptual analyses.

(2) A second file provides a concise digest of the _theoretical_
background of each semantic analysis. The author's theoretical
orientation, his assumptions, and his notational conventions are
discussed.

(3) Explanatory notes for the _semantic components_ used in the
semantic analyses are entered into a third file. These notes explain as
precisely as possible the conceptual content each author evidently
intends his component(s) to have. Included in the file are any comments
on the author's use of components that the SOLAR builders have deemed
appropriate.

(4) A file of _conceptual analyses_ contains informative summaries
of the best analyses found in the recent literature of analytic
philosophy and artificial intelligence for particular notions, primarily
those coinciding with or underlying the semantic components entered in
the third file.

(5) A _collocational feature_ file contains, for SUR words, the
definitions from _Webster's Seventh New Collegiate Dictionary (W7)_ in
which a subject label, a parenthetic phrase, a usage note, or a verbal
illustration appears. Each of these elements supplies some indication
of the words or word classes permissible in the immediate context of a
given SUR word.

(6) A _semantic field_ file(1) will provide a series of displays
showing most of the other words in the English vocabulary that stand in
a morphological, definitional, synonymitive, antonymitive, or thesaural

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(1)The structure of this file and procedures for creating it have
been specified in detail; however, coding has not yet begun on the
several programs needed.

relationship to a given word. Such relationships will be machine
derived from the W7 transcripts, a partial transcript of Webster's New
Dictionary of Synonyms, and a thesaurus transcript (hopefully the
transcript of Roget's International Thesaurus being prepared by Sally
Sedelow at the University of Kansas).

(7) A file of definitional expansions (*) will indicate the extent
and nature of the semantic connectedness among words in a particular
lexicon. For each word in a given lexicon, a display will be provided
of all the words in that lexicon that can be reached by following W7
definitional links outward to two levels of remoteness from that word.

(8) A key-word-in-context ("KWIC") file will, when complete,
contain representative contexts of a given word's occurrences in the
million-word Brown Corpus, the 1.2 million-word corpus of W7
definitions, and dialogues collected by the speech understanding groups.

The first of the supplementary files is a word index, which lists
all the words appearing in the speech understanding lexicons, the
lexicons they appear in, the parts of speech given for each word in the
lexicon together with their corresponding parts of speech in W7, and the
types of SOLAR data available for each word.

A bibliography file provides citations to the technical documents
in linguistics, philosophy, and computer science that are referenced in
other SOLAR files or may be of interest to researchers in natural
language processing.

(*)Although this file has not yet been produced, the programs needed
to build it are close to final checkout.

SOLAR DOCUMENTATION

Archive Overviews

1. Diller, T., & J. Olney. (1973) "SOLAR (A Semantically-Oriented Lexical Archive)" SDC Document SP-3725/000/00.

2. Diller, T., & J. Olney. (1974) "SOLAR (A Semantically-Oriented Lexical Archive): Current Status and Plans" Computers and the Humanities 8:301-312.

3. Diller, T. & J. Olney. (forthcoming) "SOLAR: A Comprehensive Source of Semantic Lexical Data" American Journal of Computational Linguistics.

User's Guides

4. Bye, T., T. Diller, & J. Olney. (1975) "User's Guide to the SOLAR Semantic Analysis File" SDC Document TM-5292/001/00

5. Diller, T. (1974) "User's Guide to the SOLAR Bibliography File" SDC Document TM-5292/000/02

6. Diller, T. (in prep.) "User's Guide to the SOLAR Word Index" SDC Document TM-5292/009/00

7. Diller, T., & T. Bye. (1975) "User's Guide to the SOLAR Theoretical Backgrounds File" SDC Document TM-5292/002/00

8. Diller, T., T. Bye & J. Olney. (1975) "User's Guide to the SOLAR Semantic Component File" SDC Document TM-5292/003/00

9. Diller, T., & F. Heath. (1975) "User's Guide to the SOLAR KWIC File" SDC Document TM-5292/008/00

10. Diller, T., & F. Heath. (in prep.) "User's Guide to the SOLAR Collocational Feature File" SDC Document TM-5292/005/00

11. Diller, T., F. Heath, & J. Olney. (in prep.) "User's Guide to the SOLAR Semantic Field File" SDC Document TM-5292/006/00

12. Heath, F., T. Diller, & J. Olney. (in prep.) "User's Guide to the SOLAR Definitional Expansion File" SDC Document TM-5292/007/00

13. Olney, J., F. Delacruz, T. Diller, & N. Uzuzoglu. (in prep.) "User's Guide to the SOLAR Conceptual Analysis File" SDC Document TM-5292/004/00

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2. FILE DESIGN

In scholarly lexicography, the primary basis on which the meaning of a word is analyzed into separate senses is a balanced collection of contexts of actual occurrences of the word in many different types of writing. Since the companion SOLAR files provide information on only one, or at most, a few of the senses of a given word, the KWIC file adds a measure of generality which broadens the utility of the archive. By providing the user with representative samples of the constructions in which particular words appear, we assure him a better chance of settling upon a sense analysis for a particular lexical domain which is compatible with an extension of the domain, when that occurs.

To assure maximum generality while providing data specifically related to the ARPA SUR projects, we have included contexts extracted from both written and spoken sources. The Brown Corpus provides a well-balanced source of written contexts.[5] The W7 definitions make a unique contribution because the occurrences of words in its definitions are contextually unspecialized to a far greater extent than those in the Brown Corpus or in any other sample of normal writing.[6] Supplementing these general sources of written contexts are the transcripts of the spoken SUR protocols pertaining to the SDC and CMU projects.

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[5] The Brown Corpus contains a million words of text, as extracted from 500 sources representing 15 genres of writing. It covers the same types of writing as the file of 10 million contexts used in preparing Webster's Unabridged. Details of the construction and contents of the Brown Corpus are to be found in Kucera and Francis (1967) and in the Manual of Information (1964).
[6] More than 1,200,000 contexts can be extracted from the W7 definitions; however, over a third of these consist of contexts of highly frequent function words.

Having such contexts of occurrence at his fingertips will benefit
the archive user by supplementing his linguistic intuition as to details
of the usage of a word, as in standard lexicographic practice.

The design of this file has been affected in several ways by our
intention that it be directly accessible to researchers via the ARPA
network. First, the file has been placed in a highly user-oriented data
management system to assure that the time spent by users in learning the
file structure and data management protocols will be minimal. Second,
the length of centered word plus contexts was constrained to a single
terminal output line to facilitate reading. Third, the number of lines
of context per centered-word was limited to 100 (for the Brown Corpus
and _W7_). No stop list was used, however, so contexts are included for
all SUB words (including function words) which have a match in the Brown
Corpus or the _W7_ definitions, as the case may be.

3.   DEFINITION OF FIELDS

There are 12 fields in which data can be entered.   Each will be
discussed in turn in regard to the type and format of the data allowed.

SOLAR Word:

The word for which contexts are entered (the centered word) is, for
the Brown and W2 contexts, the canonical, uninflected SOLAR word as
found in the companion Word Index file. (All inflected forms appearing
in the SUR lexicons are linked to their corresponding canonical form in
that file.)

The words in the SUR protocols have no such inflectional
limitation. Every word appearing in the protocols is included. Further,
no limitation is placed on the number of contexts included.   (The
protocols do not exceed 200 sentences in length, so an excessive number
of contexts is not a concern.)

SUR Domain:

To permit the ARPA users to qualify retrieval on the basis of the
lexicons they are currently working with, we have entered here the
name(s) of the SUR lexicons containing the centered word or one of its
inflected forms. Each name is entered with a separate field identifier
and is searchable via inverted indices.   The list of names currently
employed is as follows:(*)

(*)CMU refers to the Carnegie-Mellon University SUR project; BBN

    AP (Small Associated Press Release--CMU)
    APSYS (Large Associated Press Release--CMU)
    CHESS (Chess Playing Lexicon--CMU)
    CHT (Second Chess Playing Lexicon--CMU)
    DESCAL (Desk Calculator Lexicon--CMU)
    DOCTOR (Medical Lexicon--CMU)
    PACFLEET (Warships Lexicon--SDC)
    SMALLWORD (Core of Lunar Rocks Lexicon--BBN)
    SUBS (Subset of Jane's Fighting Ships--SDC)
    TRAVEL (Business Travel Lexicon--BBN)
    VOCAB (Pump and Faucet Repair Lexicon--SRI)
    WORDS (Expansion of SMALLWORD--BBN)

Additional lexicons can be added as requested by users.

Brown Sample:

The contexts extracted from the Brown Corpus are taken from 500
samples of text. This field identifies the sample, using the codes as
given in the machine transcripts. For detailed information about the
constitution and source of each sample, the reader should consult the
Manual of Information (1964).

Brown Line Id:

Each context appearing in the Brown Corpus is identified as to its
position within a sample by a line number. We have included that
identifying four-digit number here.

Brown Context:

The centered word and its surrounding context are found here. As
explained in section 5, DATA COLLECTION, this is a 63 character

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refers to the Bolt Beranek and Newman SUR project; SDC refers to the SUR
project at System Development Corporation; SRI refers to the Stanford
Research Institute project currently providing direct support to the SDC
SUR project.

substring of the 105 characters of context provided in the original
transcripts.

SUB Protocol:

For those contexts extracted from the protocols collected by the
SUB projects, we enter here the data by which the protocol is
identified.

SUB Sentence ID:

The unique number assigned to each sentence in a given SUB
protocols is included herein.

SUB Sentence Type:

Since protocols generally represent the interaction of a user with
a (simulated) computer, it is useful to identify the pragmatics of a
given context. This field allows a context substring to be tagged as
coming from a user's interrogative, imperative, or declarative input, a
user's parenthetic comment, the computer's response, or a monitor's
feedback.

SUB Context:

The centered word and surrounding context are entered here. All
contexts appearing in the protocol are entered; however, only 63
characters are permitted per context.

WF Main Entry:

To facilitate manual access to a broader WF context, we have

included the main entry word whose definition contains the centered
word.

W7 Main Entry Id:

The homograph number together with the sense and subsense letters
and numbers of the definition that contains the centered word are given
here.

W7 Context:

This field contains the centered word and its context as found
within a particular sense definition. As with the other contexts, a
maximum of 63 characters is permitted.

4. DATA RETRIEVAL

The information in the KWIC file is available in two modes: via
on-line queries to the SOLAR data management system over the ARPA
Network and by listings distributed by the SOLAR staff.

4.1 ON-LINE ACCESS

All SOLAR files reside in the SDC SOLAR data management system.(*)
Since the system is self-documenting and exceptionally user-oriented,
our guidance here in the use of the system is quite general.

The SOLAR data management system resides within the CMS
time-sharing system running on an IBM 370/145 at SDC. CMS is accessible
through the ARPA Network via either TELNET or TIP connections.

(1) To connect to SDC CMS via a TIP, make sure your terminal is
set to full duplex and type:

       @T <SP> O <SP> L <CR>   'transmit on linefeed'

       @L <SP> 9 <CR>   'log to host #9 (SDC)'

The response to you should be:

           OPEN   'TIP says you are now connected'

           SDC 370/145 TELNET   'SDC net msg'

           VM-370 ONLINE   'SDC time-sharing msg'

           .   'period is the login prompt'

(*)The SOLAR data management system has come into existence largely
because of the selfless, diligent, and competent work of Roy Gates.
Through his efforts the system was made compatible with the CMS
time-sharing system and the initial compilations were accomplished.
Dwight Harm also gave generously of his time and expertise.

At this point CMS is expecting you to login.

(2) To login, type: LOGIN SOLAR <CR>. SOLAR will then print some
sign-on messages and take care of mounting disk packs (if necessary).
You will then be asked to sign our visitors log. The signal for your
response throughout your interaction with SOLAR will be a hyphen (-) in
column 1. Please wait for that prompt before typing. Terminal input
may be either upper case, lower case, or a mixture.

(3) To obtain an introduction to the SOLAR DMS, ask for the
new-user format when given that option. Or, type: "EXPLAIN SUMMARY"
<CR> (with quotes). SOLAR will then give you a briefing on searching
and printing procedures, command names, and program messages.

(4) To access the KWIC file, (?) type: "FILE KWIC" <CR>.

(5) To obtain an introduction to the KWIC file, type: "EXPLAIN
DATABASE" <CR>. This will elicit the following table together with an
explanation of the various categories of information.

ABBREV	CATEGORY	SEARCHABLE
WD	SOLAR WORD	Y
DO	SUB DOMAIN	Y
BS	BROWN SAMPLE	
BI	BROWN LINE ID	
BC	BROWN CONTEXT	
BP	SUB PROTOCOL	
SI	SUB SENTENCE ID	
ST	SUB SENTENCE TYPE	X
SC	SUB CONTEXT	
WE	W7 MAIN ENTRY	
WI	W7 MAIN ENTRY ID	
WC	W7 CONTEXT	

(6) To search for contexts of interest to you, type in the term
for which you desire contexts. For example, type: analyze <CR> or

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(9) The SOLAR DMS initially accesses the bibliographic citation
file.

analy# (WD) <CR>. The search terms must be entered unpunctuated. The
#-sign stands for an indeterminate string of characters. The category
in parentheses limits the search to that single field.

A search can also be made of the non-indexed fields using the
STRINGSEARCH facility. Type "EXPLAIN STRINGSEARCH" <CR> for details.

(7) To print data once contexts have been selected, you can use
one of the following special print formats:

COMMAND	FIELDS RETURNED
"PRINT BROWN"	SOLAR Word and Brown Contexts
"PRINT SUR"	SOLAR Word and SUR Contexts
"PRINT W7"	SOLAR Word and W7 Contexts

It is also possible to tailor your print commands. Type "EXPLAIN PRINT"
<CR> for details.

(8) To halt printout of data on your terminal, hit the break key
once and wait for the SOLAR prompt (-). Then type: HT <CR> (halt
typing). When prompted again, hit <CR> and SOLAR will ask for your next
search statement.

(9) To switch to another data file, type: "FILE <FNAME>" <CR>.
For example, "FILE COMPON" <CR>. To ascertain the files available,
type: "FILES ?" <CR>.

(10) To quit your interaction with SOLAR, type: QUITIT <CR>.
SOLAR will then automatically log you out.

4.2 COMPOSED LISTINGS

The contents of this file are being made available in printed form
as well as on-line.(10) Users wishing to receive these listings should

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(12)Not all users are expected to have access to the ARPA Network

request them from Tim Diller. The user is advised, however, that the
on-line version is likely to be more current than the printouts, which
will be produced only at intervals of significant accretion.

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and some analyses may be considered unsuitable for terminal printout
because of their length.

5.   DATA COLLECTION

The KWIC file is being built totally under algorithmic control by programs that extract data from machine readable transcripts of the Brown Corpus,[11] of _Webster's Seventh New Collegiate Dictionary_,[12] and of dialogs collected by the ARPA Speech Understanding Research projects.

The included Brown Corpus contexts are but a small subset of those available in the original Corpus tapes.   First, we extract contexts for only those words appearing in the SOLAR Word Index.   Second, the length of each context is reduced from 105 characters to 63.[13] Third, we extract only the first 100 contexts for a given word.   For the 1100 most frequently occurring words, this results in some loss of generality since the samples from which the contexts are extracted most probably do not come from all the different genres of writing.   (If this is determined to be a significant drawback, appropriate revision of our extraction program will be made.) With these limitations and a SOLAR word list of about 2500 terms, contexts have been entered from the Brown Corpus for 2164 words.

The W7 definition contexts have not yet been entered into the SOLAR data management system (DMS).   However, such contexts have been derived from the W7 transcripts by Olney's Semantic Foundations Project (cf.

Olney and Ramsey (1972)). The reformatting of these contexts for input
to the SOIAR DMS will be undertaken following a period of evaluation of
the utility of the Brown contexts.

Four SUR protocols are currently in hand and being readied for
inclusion in the archive. Two protocols were collected for the SDC SUR
project by Barbara Deutsch of SRI. They consist of about 120 queries
posed during an experiment at the Naval Postgraduate School in
Monterey, California. A member of the faculty at the school simulated
the computer using a copy of the SDC submarine data base taken from
Jane's Fighting Ships. Two naval officers were assigned tasks that
required them to fill out three charts and solve two problems, all
requiring information about specifications and performance
characteristics of submarines in the U.S., Soviet, and British fleets.
One subject was a lieutenant with computer experience but no experience
on submarines. The other was a lieutenant with several years experience
on nuclear submarines and no computer background. These differences are
reflected in the questions asked by the two subjects.

The third SDC protocol was based on the same task domain but was
collected at SDC. The subject was knowledgeable in computers but
unfamiliar with submarines.

The fourth protocol consists of 200 sentences collected by the CMU
SUR project. This protocol differs from the others mainly in being
simply a collection of sentences which could be posed to the CMU
Associated Press Release data base. There is no continuity of thought
from one question to the next or from an answer to the next question;
i.e., there was no 'task' or 'goal' requiring more than a single
sentence to resolve.

22

6. REFERENCES

Diller, T. and J. Olney. (1973) "SOLAR (A Semantically-Oriented Lexical Archive)" SDC Document SP-3726/000/00.

Kucera, H. and W. Francis. (1967) Computational Analysis of Present-Day American English. Providence, R.I.: Brown University Press.

Manual of Information. (1964) Providence, R.I.: Department of Linguistics, Brown University.

Olney, J. and D. Ramsey. (1972) "From Machine-Readable Dictionaries to a Lexicon Tester: Progress, Plans, and an Offer" Computer Studies in the Humanities and Verbal Behavior 3.4:213-220.

7.   SAMPLE ON-LINE INTERACTION

SS 1 /C: <SOLAR asks for first search statement or command>
-"file kwic"   <user chooses to access KWIC file>

YOU ARE NOW CONNECTED TO THE KWIC DATABASE.

SS 1 /C: <SOLAR asks for search statement or command>
-get   <user asks for entry having 'get' as searchable term>

ENTRIES (1)   <SOLAR indicates there is one such entry>

SS 2 /C: <SOLAR asks for next search statement or command>
-"print brown"   <USER commands print of Brown contexts>

WD- GET
BC- TION ABOVE 150,000,000 WOULD GET ONE ADDITIONAL POST FOR EACH A
BC-   DALLAS MAY GET   TO HEAR A DEBATE ON HORS
BC- ALLAS AND OTHER LARGE CITIES GET MONEY WHICH COTTEN FELT COULD
BC- OPERTY   IT IS IMPOSSIBLE TO GET A FAIR TRAIL WHEN SOME OF THE
BC- ND MADE A GENUINE ATTEMPT TO GET INFORMATION AND UNDERSTANDING
BC- EP WITH THE 'CIO ATTEMPT TO GET ALL THE ALLIED CARS BACK ON TH
BC-   A   JOSEPH NUGENT TO GET   THE BENEFIT OF HIS VIEWS
BC- USUAL HE MADE NO ATTEMPT TO GET IN TOUCH WITH CARMINE
BC- AS NINETY-NINE MEMBERS WOULD GET TWO PROFESSIONAL POSTS SUCH A
BC-   EACH MEMBER WOULD GET ONE POST FOR EACH 10,000,000 P
BC- ISSUE   LEGISLATORS ALWAYS GET RESTLESS FOR A SPECIAL SESSION
BC- NOW THE FULL AMOUNT UNTIL WE GET A FULL REPORT   WAGNER SAID
BC- PERATE SO FAR AS POSSIBLE TO GET THE CHILDREN TO WHERE THE PARE
BC- SITION HE PLAYS AND YOU**ALL GET THE   QUICK RESPONSE   PLACE-K
BC- BACK ALL SEASON UP DIDN**AT GET INTO A SINGLE GAME
BC- ECLARED   ONCE YOU   GET THE FEEL OF   IT THERE**AS NOT
BC- SOME OF THEM CAN**AT SEEM TO GET THE FEEL PRACTICE HELPS YOU
BC- FEEL PRA!
-bt   <after hitting the break key user tells CAS to halt typing>
-            <CAS asks for next input, user responds with <CR>>

SS 2 /C: <SOLAR asks for next search statement or command>
-quitit   <user asks to be logged out>